WHAT IS CLAIMED IS:

1. A method of operating a torque transmitting apparatus which receives torque from a rotary output element of a prime mover and transmits torque to a rotary input element of an automatic transmission in a power train of a vehicle, wherein a hydrokinetic torque converter is arranged to transmit torque between the output and input elements in parallel with a slip clutch and wherein the magnitude of torque being transmitted by the clutch is selectively variable by a computerized regulating unit, comprising the steps of regulating the transmission of torque by the clutch as a function of the magnitude of torque being transmitted by the output element of the prime mover including ascertaining and adaptively applying to the clutch a variable force for the transmission of a predetermined torque by the clutch with attendant automatic selection of a minimum slip between a torque receiving and a torque transmitting part of the power train; and carrying out a compensation, particularly long-range compensation, for eventual differences between the predetermined and actual torques being transmitted by the clutch.

2. The method of claim 1, wherein the torque to be transmitted by the clutch as a function of the RPM of the output element of the prime mover is ascertained by the regulating unit in accordance with the equation

$$M_{clutch} = k_{me} \cdot k_{corr} \cdot (M_{pm} + M_{corr\ pm}) + M_{corr\ wu}$$

wherein M_{clutch} is the torque to be transmitted by the clutch, k_{me} is a torque dividing factor which is at least substantially constant within the entire operating range of the power train, k_{corr} is a factor for correction of multiplicative errors, $M_{corr\ pm}$ is correction torque to compensate for errors added to the M_{pm}, and $M_{corr\ wu}$ is correction torque compensating for errors added to the clutch torque M_{clutch}, said minimum slip between torque receiving and torque transmiting parts of the power train being automatically selected as a function of said torque dividing factor and long-range compensation for any departures of actual torques from the predetermined torques being carried out in dependency upon the correction factor k_{corr} and correction torques $M_{corr\ pm}$ and $M_{corr\ wu}$.

3. The method of claim 2, wherein the torque dividing factor k_{me} is a function of the RPM of the rotary output element.

4. The method of claim 2, wherein the torque dividing factor k_{me} is a function exclusively of the RPM of the rotary output element.

5. The method of claim 2, wherein the torque dividing factor k_{me} is a function of the RPM and of the torque being transmitted by the rotary output element.

6. The method of claim 1, wherein the torque dividing factor k_{me} is a function of the RPM and torque being transmitted by the prime mover.

7. The method of claim 1, wherein the magnitude of the torque being transmitted by the clutch is variable by a pressure differential between two bodies of a hydraulic fluid one of which is confined in a first compartment between a housing of the torque converter and the clutch and the other of which is confined in a second compartment between the housing and the clutch.

8. The method of claim 1, wherein the prime mover is a combustion engine and the operating condition of the power train is a function of at least one of a plurality of variable parameters including (a) the RPM of the rotary output element and the position of a throttle control lever of the vehicle, (b) the RPM of the rotary output element and the rate of admission of fuel to the engine, (c) the RPM of the rotary output element and the subatmospheric pressure in a suction pipe of the engine, and (d) the RPM of the rotary output element and the duration of fuel injection into the engine.

9. The method of claim 1, wherein said regulating step includes shifting from the transmission by the clutch of a first torque to the transmission of a different second torque with a delay which is a function of a variable parameter denoting the division of torque being transmitted by the rotary output element of the prime mover into a first torque being transmitted by the torque converter and a second torque being transmitted by the clutch.

10. The method of claim 9, wherein the variable parameter is a pressure differential between two bodies of fluid in the torque converter at opposite sides of a pressure plate of the clutch.

11. The method of claim 9, wherein the variable parameter is variable as a function of a difference between the RPM of the rotary output element and the RPM of the rotary input element.

12. The method of claim 9, wherein the variable parameter is variable as a function of a gradient of the RPM of the rotary output element.

13. The method of claim 9, wherein the variable parameter is a pressure differential between two bodies of hydraulic fluid in the torque converter at opposite sides of a pressure plate of the clutch, the pressure differential being variable by one of (a) a PI regulator and (b) a PID regulator.

14. The method of claim 13, wherein the variation of pressure differential by the one regulator can be unequivocally defined by a non-analytical technique.

15. The method of claim 1, wherein the magnitude of torque being transmitted by the clutch is variable by a pressure differential between two bodies of hydraulic fluid confined in a housing of the torque converter at opposite sides of a pressure plate of the clutch and the pressure differential is variable as a result of scanning a characteristic curve and utilizing the thus obtained signals to determine differences between actual and desired pressure differentials, said regulating step further comprising eliminating said differences by establishing an I return flow of fluid from one of the compartments into the other of the compartments, the variation of pressure differential being unequivocally definable by a non-analytical technique.

16. The method of claim 15, wherein the signals are generated as a result of variable flow of fluid between the two bodies of fluid through an adjustable valve.

17. The method of claim 1, wherein the magnitude of torque being transmitted by the clutch is variable by a pressure differential between two bodies of hydraulic fluid confined in the torque converter at opposite sides of a pressure plate of the clutch and the pressure differential is variable by one of (a) a PI regulator, (b) an I regulator and (c) a PID regulator.

18. The method of claim 17, wherein signals are generated as a result of variable flow of hydraulic fluid between the two bodies of fluid as a function of one of (a) a duty factor and (b) a fluid flow through an adjustable valve, the variation of pressure differential being unequivocally definable by a non-analytical technique.

19. The method of claim 1, wherein the step of carrying out compensation includes monitoring the actual torques being transmitted by the clutch and comparing the monitored actual torques with reference values.

20. The method of claim 1, wherein the step of carrying out compensation includes computing the torque being transmitted by the torque converter on the basis of the characteristics of the torque converter and determining the actual ratio of torques being transmitted by the torque converter and the clutch.

21. The method of claim 1, wherein the torque to be transmitted by the clutch as a function of the RPM of the output element of the prime mover is ascertained by the regulating unit in accordance with the equation

$$M_{clutch} = k_{me} \cdot k_{corr} \cdot (M_{pm} + M_{corr\ pm}) + M_{corr\ wu}$$

wherein M_{clutch} is the torque to be transmitted by the clutch, k_{me} is a torque dividing factor which is at least substantially constant within the entire operating range of the power train, k_{corr} is a factor for correction of multiplicative errors, M_{corr} is correction torque to compensate for errors added to the M_{pm}, and $M_{corr\ wu}$ is correction torque compensating for errors added to the clutch torque M_{clutch}, said minimum slip between torque receiving and torque transmitting parts of the power train being automatically selected as a function of the torque dividing factor k_{me} and long-range compensation for any departures of actual torques from the predetermined torques being carried out in dependency upon the correction

CLAIM 21, CONTINUED

factor k_{corr} and correction torques $M_{corr\ pm}$ and $M_{corr\ wu}$, the differences between the actual and predetermined torques being transmitted by the clutch being attributable to at least one of (a) multiplicative errors ($k_{corr} \neq 0$, $M_{corr\ pm} = 0$, $M_{corr\ wu} = 0$), (b) errors additive to prime mover torque ($k_{corr} \neq 0$, $M_{corr\ pm} \neq 0$, $M_{corr\ wu} = 0$), (c) errors additive to the clutch torque ($k_{corr} \neq 0$, $M_{corr\ pm} = 0$, $M_{corr\ wu} \neq 0$), (d) multiplicative errors and additive errors to prime mover torque ($k_{corr} \neq 0$, $M_{corr\ pm} \neq 0$, $M_{corr\ wu} = 0$), (e) errors multiplicative and additive to prime mover torque ($k_{corr} \neq 0$, $M_{corr\ pm} = 0$, $M_{corr\ wu} \neq 0$) and (f) errors multiplicative of and additive to prime mover torque and clutch torque ($k_{corr} \neq 0$, $M_{corr\ pm} \neq 0$, $M_{corr\ wu} \neq 0$), said step of carrying out compensation taking place with a time constant of several seconds to thus impart to the step of carrying out compensation a purely adaptive character.

22. The method of claim 1, wherein the prime mover is operable at a plurality of speeds and further comprising the step of utilizing signals denoting a desired acceleration of the prime mover by an operator of the vehicle to increase the slip of the clutch as a result of a reduction of a factor k_{me} denoting the division of torque being transmitted by the rotary output element into first and second torques respectively transmitted by the torque converter and the clutch with attendant establishment of additional spare torque tranmittable by the torque converter.

23. The method of claim 1, wherein the transmission has a plurality of drive ratios and said regulating step includes utilizing the slip of the clutch at each of said drive ratios as a primary factor and the efficiency of the torque converter as a secondary factor for the transmission of torque from the rotary output element to the rotary input element to thus permit the utilization of a torque converter operating with a high stall speed and having a wide torque conversion range.

24. The method of claim 1, wherein the transmission has a plurality of speed ratios and said regulating step includes utilizing the slip of the clutch at each of said speed ratios as a primary factor and the efficiency of the torque converter as a secondary factor for the transmission of torque from the rotary output element to the rotary input element to thus permit the utilization of a torque converter operating with a high stall speed and having a wide torque conversion range.

25. A method of operating a torque transmitting apparatus which receives torque from a rotary output element of a prime mover, such as a combustion engine, and transmits torque to a rotary input element of an automatic transmission in a power train of a vehicle, wherein a hydrokinetic torque converter is arranged to transmit torque between the output and input elements in parallel with a slip clutch, and wherein the magnitude of torque being transmitted by the clutch is variable by a monitoring unit in conjunction with a central computer unit and the application of force to, and hence the magnitude of torque being transmitted by, the clutch is selectively regulatable by the computer unit, comprising the steps of ascertaining the magnitude of torque to be transmitted by the clutch in dependency upon the operating

condition of the power train in accordance with the equation

$$M_{clutch} = k_e \cdot k_{corr} \cdot M_{pm}$$

wherein $k_e = k_{me}$ denoting a torque dividing factor which is at least substantially constant within the entire operating range of the power train, k_{corr} is a correction factor, M_{clutch}, is the torque being transmitted by the clutch and M_{pm} is the torque being transmitted by the rotary output element of the prime mover, ascertaining the magnitude of the force to be applied to the clutch for the transmission of a predetermined torque, applying the thus ascertained force to the clutch with attendant automatic selection of the slip between the output and input elements as a function of the torque dividing factor k_e and compensation for eventual departures from the desired torque transmission, as a function of the correction factor k_{corr}, due to the characteristics of the selected power train.

26. A method of operating a torque transmitting apparatus, particularly in a power train of a motor vehicle, which receives torque from a rotary output element of a prime mover, such as a combustion engine, and transmits torque to a rotary input element of an automatic transmission, wherein a hydrokinetic torque converter is arranged to transmit torque between the output and input elements in parallel with a slip

clutch, and wherein the magnitude of torque being transmitted by the clutch is selectively variable by a monitoring device in conjunction with a central computer unit, comprising the steps of ascertaining the magnitude of torque M_{clutch} to be transmitted by the clutch in dependency upon the operating condition of the torque transmitting apparatus in accordance with the equation $M_{clutch} = k_e \cdot k_{corr} \cdot M_{pm}$ wherein $k_e = k_{me}$ denoting a torque dividing factor which is independent of a characteristic field of the prime mover, k_{corr} is a correction factor and M_{pm} is the torque being transmitted by the prime mover, ascertaining the magnitude of the force to be applied to the clutch for the transmission of a predetermined torque, and applying the thus ascertained force to the clutch with attendant automatic selection of the slip between the output and input elements as a function of the factor k_e and compensation for eventual departures from the desired torque transmission, as a function of the correction factor k_{corr}, due to the characteristics of the selected power train.

27. A method of operating a torque transmitting apparatus, particularly in a power train of a motor vehicle, which receives torque from a rotary output element of a prime mover, such as a combustion engine, and transmits torque to

CLAIM 27, CONTINUED

a rotary input element of an automatic transmission, wherein a hydrokinetic torque converter is arranged to transmit torque between the output and input elements in parallel with a slip clutch, and wherein the magnitude of torque being transmitted by the clutch is selectively variable by a monitoring device in conjunction with a central computer unit, comprising the steps of ascertaining the magnitude of torque M_{clutch} to be transmitted by the clutch in dependency upon the operating condition of the torque transmitting apparatus in accordance with the equation $M_{clutch} = k_e \cdot k_{corr} \cdot M_{pm}$ wherein $k_e = k_{me}$ denoting a torque dividing factor which is dependent only upon the RPM of the output element of the prime mover, k_{corr} is a correction factor and M_{pm} is the torque being transmitted by the prime mover, ascertaining the magnitude of the force to be applied to the clutch for the transmission of a predetermined torque, and applying the thus ascertained force to the clutch with attendant automatic selection of the slip between the output and input elements as a function of the factor k_e and compensation for eventual departures from the desired torque transmission, as a function of the correction factor k_{corr}, due to the characteristics of the selected power train.

28. A method of operating a torque transmitting apparatus, particularly in a power train of a motor vehicle, which receives torque from a rotary output element of a prime mover, such as a combustion engine, and transmits torque to a rotary input element of an automatic transmission, wherein a hydrokinetic torque converter is arranged to transmit torque between the output and input elements in parallel with a slip clutch, and wherein the magnitude of torque being transmitted by the clutch is selectively variable by a monitoring device in conjunction with a central computer unit, comprising the steps of ascertaining the magnitude of torque M_{clutch} to be transmitted by the clutch in dependency upon the operating condition of the torque transmitting apparatus in accordance with the equation $M_{clutch} = k_e \cdot k_{corr} \cdot M_{pm}$ wherein $k_e = k_{me}$ denoting a torque dividing factor which is dependent upon the RPM of the output element of the prime mover and the magnitude of torque being transmitted by the output element of the prime mover, k_{corr} is a correction factor and M_{pm} is the torque being transmitted by the prime mover, ascertaining the magnitude of the force to be applied by the clutch for the transmission of a predetermined torque, and applying the thus ascertained force to the clutch with attendant automatic selection of the slip between the output and input elements as a function of the factor k_e and compensation for eventual departures from the desired torque

transmission, as a function of the correction factor k_{corr}, due to the characteristics of the selected power train.

29. A method of operating a torque transmitting apparatus which receives torque from a rotary output element of a prime mover, such as a combustion engine, and transmits torque to a rotary input element of an automatic transmission in a power train of a vehicle, wherein a hydrokinetic torque converter is arranged to transmit torque between the output and input elements in parallel with a slip clutch, wherein the magnitude of torque being transmitted by the clutch is variable by a pressure differential between two bodies of a hydraulic fluid one of which is confined in a first compartment between a housing of the torque converter and the slip clutch and the other of which is confined in a separate second compartment between the housing and the clutch, and wherein the pressure differential is variable by a monitoring unit in conjunction with a central computer unit and the application of force to, and hence the magnitude of torque being transmitted by, the clutch is selectively regulatable by the computer unit, comprising the steps of ascertaining the magnitude of torque to be transmitted by the clutch in dependency upon the operating condition of the power train in accordance with the equation

$$M_{clutch} = k_e \cdot k_{corr} \cdot M_{pm}$$

wherein $k_e = k_{me}$ denoting a torque dividing factor which satisfies at least one of the requirements including (a) at least substantial constancy within the entire operating range of the power train, (b) independence from a characteristic field of the prime mover, (c) dependency exclusively upon the RPM of the output element of the prime mover, and (d) dependency upon the RPM of the prime mover and the magnitude of torque being transmitted by the ouptut element, k_{corr} is a correction factor, M_{clutch} is the torque being transmitted by the clutch and M_{pm} is the torque being transmitted by the rotary output element of the prime mover, ascertaining the magnitude of the force to be applied to the clutch for the transmission of a predetermined torque, and applying the thus ascertained force to the clutch with attendant automatic selection of the slip between the output and input elements as a function of the torque dividing factor k_e and compensation for eventual departures from the desired torque transmission, as a function of the correction factor k_{corr}, due to the characteristics of the selected power train.

30. The method of claim 29, wherein the prime mover is a combustion engine the operating condition of which is dependent upon the RPM of the output element and the position of a throttle control lever of the vehicle.

31. The method of claim 29, wherein the prime mover is a combustion engine the operating condition of which is dependent upon the RPM of the output element and the subatmospheric pressure in a suction pipe of the engine.

32. The method of claim 29, wherein the prime mover is a combustion engine the operating condition of which is dependent upon the RPM of the output element and the duration of fuel injection into the engine.

33. The method of claim 29, further comprising the step of selecting in the central computer unit that torque which is to be transmitted by the clutch in response to changes of the torque being transmitted by the power train in accordance with the following undertakings: (A) advance determination of a parameter X which is indicative of the torque being transmitted by the clutch at an instant t_{n+1} after the elapse of a monitoring interval and which is ascertained in accordance with a function excluding at least one undesirable phenomenon, such as blocking of the clutch, (B) determination of a gradient ΔX which is required to arrive at a desired value of the parameter X after elapse of an interval Δt, (C) applying the thus determined gradient ΔX with a hydraulic system including a proportionality regulation wherein a parameter includes a pressure differential ΔP established in advance between bodies of a hydraulic fluid at opposite sides of a pressure plate of the clutch in a housing of the torque converter in accordance with the equation

$$\Delta P_{n+1} = (1 - \beta) \cdot \Delta P_{desired} + \beta \cdot P_n$$

wherein $\beta = f(T_v, t)$, and (D) repeating the steps (A), (B) and (C) until the parameter X at least closely approximates the desired parameter.

34. The method of claim 29, further comprising the step of selecting in the central computer unit that torque which is to be transmitted by the clutch, in response to changes of torque being transmitted by the power train, in accordance with the following undertakings: (A) determining a gradient ΔX of a parameter X which is indicative of the torque being transmitted by the clutch and is ascertained in accordance with a function excluding at least one undesirable phenomenon, such as short-lasting blocking of the clutch, (B) applying the gradient ΔX with a hydraulic system wherein the gradient is indicative of a pressure differential ΔP between two bodies of hydraulic fluid at opposite sides of a pressure plate of the clutch in a housing of the torque converter and is arrived at in accordance with the equation

$$\Delta\Delta P = C_1 \cdot (\Delta P_{desired} - \Delta P_n)$$

wherein C_1 is a proportionality factor, and (C) repeating the steps (A) and (B) until the parameter X at least approximates a desired value.

35. The method of claim 29, wherein a reduction of torque being transmitted to the torque converter is likely to develop as a result of at least one of a plurality of occurrences including shifting of the transmission into a lower drive ratio and attachment of at least one auxiliary aggregate to an output element of the transmission and wherein said reduction of torque is likely to entail short-lasting blockage of the clutch, further comprising the steps of reducing the magnitude of torque being transmitted by the clutch including at least one of the following undertakings: (A) reducing the factor k_e by a predetermined value, (B) reducing the factor k_{corr} by a predetermined value, and thereupon gradually increasing each reduced factor as a function of time to a value which ensures insulation of the transmission against vibrations and economical fuel consumption by the prime mover.

36. The method of claim 29, wherein a reduction of torque being transmitted by the apparatus is likely to develop as a result of at least one of a plurality of occurrences including shifting of the transmission into a different drive ratio and attachment of at least one aggregate to an output element of the transmission and wherein said reduction of torque is likely to entail short-lasting blockage of the clutch, further comprising the steps of reducing the magnitude of torque being transmitted by the clutch including at least one of the following undertakings: (A) reducing the factor k_e by a predetermined value, and (B) reducing the factor k_{corr} by a predetermined value, and thereupon increasing each reduced factor as a function of time to a value which ensures insulation of the transmission from vibrations and economical fuel consumption by the prime mover.

37. The method of claim 29, wherein the factor k_{corr} is indicative of the selected power train in the vehicle and further comprising the steps of selecting the factor k_{corr} to compensate for eventual departures of the characteristics of the selected power train from desired characteristics including monitoring that slip of the clutch which develops in a predetermined quasi stationary range of operation of the apparatus with a time delay which is sufficient to prevent the transmission of fluctuations of transmitted torque, comparing the monitored slip with a reference value which is selected to ensure optimal insulation of the transmission from vibrations and economical fuel consumption by the prime mover, and altering the slip of the clutch when the monitored slip departs from the reference value.

38. The method of claim 29, further comprising the step of reducing at least one of the factors k_e and k_{corr} in response to detected indication of intended acceleration of the prime mover, such as by a change of the position of a throttle control lever of the vehicle, with attendant increase of slip of the clutch and the establishment of additional spare torque transmittable by the torque converter.

39. The method of claim 29, wherein the transmission has a plurality of drive ratios and said regulating step comprises utilizing the slip of the clutch at each of said drive ratios as a primary factor and the efficiency of the torque converter as a secondary factor for transmission of torque from the rotary output element to the rotary input element to thus permit the utilization of a torque converter having a wide torque conversion range.

40. The method of claim 29, wherein said regulating step comprises utilizing the slip of the clutch at each speed ratio of the transmission as a primary factor and the efficiency of the torque converter as a secondary factor for transmission of torque from the rotary output element to the rotary input element to thus permit the utilization of a torque converter having a wide torque conversion range.

41. A method of regulating, as a function of the magnitude of torque, the slip of a friction clutch which transmits torque jointly with a hydrokinetic torque converter to a transmission having a plurality of speed ratios including at least two forward speed ratios, comprising the step of selecting - at least for said forward speed ratios - the slip as a function of at least one of two variable parameters including the energy requirements and the output of the torque transmitting apparatus including the clutch and the torque converter.

42. A method of regulating the operation of a driving unit wherein a rotary output element of a combustion engine transmits torque to a hydrokinetic torque converter and to a slip clutch, comprising the step of selecting the slip of the clutch in two stages including a first stage while the output element transmits between about 10% and about 60% of a maximum torque capable of being transmitted by the engine and a second stage while the output element transmits torque exceeding the torque being transmitted during the first stage.

43. The method of claim 42, wherein the maximum torque transmittable by the slip clutch during said first stage is between at least 1 and 1.2 times the torque being transmitted by the output element of the engine.

44. The method of claim 42, wherein the maximum torque transmittable by the clutch during said first stage at least matches the torque being transmitted by the engine.

45. A method of regulating the operation of a driving unit wherein a rotary output element of a combustion engine transmits torque to a hydrokinetic torque converter and to a slip clutch, comprising the steps of selecting the slip of the clutch in two stages including a first stage while the output element transmits between about 15% and about 50% of a maximum torque capable of being transmitted by the engine and a second stage while the output element transmits torque exceeding the torque being transmitted during the first stage.

46. A method of operating a driving unit adapted for use in a motor vehicle and having a variable-speed combustion engine with a rotary torque transmitting output element, a transmission, a hydrokinetic torque converter driven by the output element and arranged to transmit torque to the transmission, and an adjustable slip clutch engageable to transmit torque from the output element to the tansmission, comprising the step of adjusting the slip clutch as a function of variations of torque being transmitted by the output element.

47. The method of claim 46, wherein the transmission is an automatic transmission.

48. The method of claim 47, wherein the automatic transmission is a multi-step transmission.

49. The method of claim 47, wherein the automatic transmission is a continuously variable transmission.

50. The method of claim 47, wherein the automatic transmission is an infinitely variable transmission.

51. The method of claim 47, wherein the automatic transmission is an infinitely variable transmission including sheaves and at least one endless flexible element trained over the sheaves.

52. The method of claim 47, wherein the automatic transmission is shiftable into a finite number of drive ratios.

53. The method of claim 47, wherein the automatic transmission is shiftable into an infinite number of drive ratios.

54. Apparatus for transmitting torque between a variable-speed rotary output element of a prime mover and a rotary input element of a driven unit, comprising a hydrokinetic torque converter including a housing rotatable about a predetermined axis, defining a fluid-containing chamber and receiving torque from the output element, a pump driven by said housing, a turbine disposed in said housing and arranged to transmit torque to said input element, and a stator disposed in said housing between said pump and said turbine; and a friction clutch having a piston disposed in said chamber between said turbine and said housing and comprising a conical radially outer portion movable in the direction of said axis into and from frictional engagement with a complementary portion of said housing to thereby respectively engage and disengage the clutch, said piston further having a radially inner portion non-rotatably and sealingly connected with said turbine.

55. The apparatus of claim 54, wherein said radially inner portion of said piston includes a first hub and said turbine includes a second hub, one of said hubs being sealingly and non-rotatably telescoped into the other of said hubs.

56. The apparatus of claim 54, wherein said complementary portion of said housing and said radially outer portion of said piston diverge radially outwardly and away from said turbine as seen in the direction of said axis.

57. The apparatus of claim 54, further comprising a torsional damper between said clutch and said turbine, said damper including an input member non-rotatably connected with said piston, an output member non-rotatably connected with said turbine, and at least one annular torque transmitting member disposed between said input and output members and acting in a cirumferential direction of said piston.

58. The apparatus of claim 54, further comprising a torsional damper between said clutch and said turbine, said damper having an output member non-rotatably connected with a radially outer portion of said turbine.

59. The apparatus of claim 54, further comprising a torsional damper between said clutch and said turbine, said damper including an annular output member bonded to said turbine and having motion transmitting portions extending toward said radially outer portion of said piston.

60. The apparatus of claim 54, further comprising a torsional damper between said clutch and said turbine, said damper including an input member having at least one leaf spring non-rotatably connected with said piston, said radially outer portion of said piston having a friction face confronting a friction face of said complementary portion of said housing and a surface facing away from said friction faces, said damper further having energy storing elements extending circumferentially of said radially outer portion of said piston and said input member further having first projections extending from said surface and at least partially surrounding said energy storing elements and second projections alternating with said energy storing elements in the circumferential direction of said radially outer portion of said piston.

61. Apparatus for transmitting torque in a power train between a variable-speed rotary output element of a prime mover and a rotary input element of an automatic transmission installed in a conveyance and having a plurality of speed ratios, comprising a hydrokinetic torque converter receiving torque from said output element and arranged to transmit torque to said input element, said torque converter including a housing receiving torque from said output element and defining a fluid-containing chamber, and a turbine rotatable about a predetermined axis; a slip clutch connected in parallel with said torque converter and including a piston disposed in and dividing said chamber into first and second compartments, said piston being movable in the direction of said axis to thereby engage and disengage the clutch as a result of the establishment of pressure differentials between the fluids in said compartments so that said pressure differentials determine the magnitude of torque being transmitted by said clutch from said housing to said turbine; and means for selecting said pressure differentials for all speed ratios of said transmission as a function of at least one of a plurality of variable parameters, including means for monitoring said at least one paramater, said torque converter having a ratio greater than 2.5.

62. The apparatus of claim 61, wherein said at least one parameter is the heat which is generated by the apparatus while the conveyance is in motion and said selecting means includes means for comparing the thus ascertained heat with a predetermined value denoting a maximum permissible heat.

63. The apparatus of claim 61, wherein said selecting means includes means for establishing a pressure differential which entails a reduction of heat generation by said clutch in response to detection by said selecting means of at least one of a plurality of circumstances of operation of the conveyance.

64. The apparatus of claim 63, wherein said selecting means is operative to select a pressure differential at which said clutch is operated with a minimal slip of said piston and said housing relative to each other except when said at least one circumstance of operation involves starting or acceleration or movement of the conveyance along sloping roads.

65. The apparatus of claim 61, further comprising a torsional damper interposed between said piston and said turbine to damp fluctuations of torque being transmitted by said clutch at least when the conveyance is operated at a partial load.

66. Apparatus for transmitting torque in a power train between a variable-speed rotary output element of a prime mover and a rotary input element of an automatic transmission installed in a power train of a conveyance and having a plurality of transmission ratios, comprising a hydrodynamic torque converter having a conversion ratio greater than 2.5 and including a housing rotatable by said output element and defining a fluid-containing chamber, and a turbine rotatable in said chamber about a predetermined axis and arranged to transmit torque to said input element; a slip clutch disposed in parallel with said torque converter and including a piston installed in and dividing said chamber into a first compartment for said turbine and a second compartment, said piston being movable in the direction of said axis to thus at least partially engage and disengage the clutch in response to the establishment of different pressure differentials between the fluids in said compartments, said piston having a friction face in contact with a friction

CLAIM 66, CONTINUED

face of said housing in the engaged condition of said clutch; and computerized means including a hydraulic circuit between said compartments and operative to select the pressure differential and hence the magnitude of torque being transmitted by said clutch at least at some of said transmission ratios.

67. The apparatus of claim 66, wherein said computerized means is operative to select the pressure differential as a function of the heat which is generated by the apparatus while the conveyance is in motion and to compare the thus ascertained heat with a predetermined value denoting a maximum permissible heat.

68. The apparatus of claim 66, wherein said computerized means includes means for establishing a pressure differential which entails a reduction of heat generation by said clutch in response to detection by a selecting means of said computerized means of at least one of a plurality of extreme circumstances of operation of the conveyance.

69. The apparatus of claim 68, wherein said selecting means is operative to select a pressure differential at which said clutch is operated with a minimal slip of said piston and said housing relative to each other except when said at least one circumstance of operation involves starting or acceleration or movement of the conveyance along sloping roads.

70. The apparatus of claim 66, further comprising a torsional damper interposed between said piston and said turbine to damp fluctuations of torque being transmitted by said clutch at least when the conveyance is operated at a partial load.

71. Apparatus for transmitting torque in a power train between a variable-speed rotary output element of a prime mover and a rotary input element of an automatic transmission installed in a power train of a conveyance and having a plurality of forward transmission ratios, comprising a hydrodynamic torque converter having a conversion ratio greater than 2.5 and including a housing rotatable by said output element and defining a fluid-containing chamber, and a turbine rotatable in said chamber about a predetermined axis and arranged to transmit torque to said input element; a slip clutch disposed in parallel with said torque converter and including a piston installed in and dividing said chamber into a first compartment for said turbine and a second compartment, said piston being movable in the direction of said axis to thus at least partially engage and disengage the clutch in response to the establishment of different pressure differentials between the fluids in said compartments, said piston having a friction face in contact with a friction face of said housing in the engaged condition of said clutch; and computerized means including a hydraulic circuit between said compartments and operative to select the pressure differential and hence the magnitude of torque being transmitted by said clutch, said clutch being at least partly engaged at least during a portion of the interval of operation of the transmission at any one of said forward ratios.

72. Apparatus for transmitting torque in a power train between a variable-speed rotary output element of a prime mover and a rotary input element of an automatic transmission installed in a power train of a conveyance and having a plurality of forward transmission ratios, comprising a hydrodynamic torque converter arranged to transmit torque between said elements; a slip clutch disposed in parallel with said torque converter and being engageable to transmit torque from said output element to said input element; and means for regulating the slip of said clutch in each forward ratio of said transmission as a function of at least one of a plurality of variable parameters including the energy requirements and the output of the torque transmitting apparatus.

73. A driving unit comprising a combustion engine having a rotary output element for transmission of torque including a nominal torque; a hydrokinetic torque converter receiving torque from said output element; a slip clutch engageable to transmit torque from said output element; and a torsional damper disposed between said clutch and said torque converter and having a capacity for transmission of torques at most matching said nominal torque.

74. The driving unit of claim 73, wherein a maximum torque transmittable by said damper is between about 10% and about 60% of a maximum torque transmittable by said engine.

75. The driving unit of claim 73, wherein a maximum torque transmittable by said damper is between about 25% and about 50% of a maximum torque transmittable by said engine.

76. The driving unit of claim 73, wherein said damper is devoid of friction generating means.

77. The driving unit of claim 73, wherein said damper includes rotary input and output members turnable relative to each other through angles of between about ±2° and about 8°.

78. The driving unit of claim 73, wherein said damper includes rotary input and output members turnable relative to each other through angles of between about ±3° and about 6°.

79. The driving unit of claim 73, wherein said damper has a rigidity of between about 7 Nm/° and about 30 Nm/°.

80. A driving unit comprising a combustion engine including a torque transmitting rotary output element; a hydrokinetic torque converter receiving torque from said output element; a slip clutch engageable to transmit torque from said output element; and a torsional damper between said clutch and said torque converter, said damper being operative to damp eventual fluctuations of torque being transmitted by said output element within a first range of magnitudes of torque being transmitted by said output element and said clutch being operative to damp eventual fluctuations of torque being transmitted by said output element within a different second range of magnitudes of torque being transmitted by said output element.

81. The driving unit of claim 80, wherein said clutch is adjustable to transmit torques of varying magnitude, and further comprising means for reducing the torque transmitting capacity of said adjustable clutch within said first range in response to high-frequency fluctuations of torque.

82. The driving unit of claim 81, wherein said means for reducing the torque transmitting capacity of said clutch is responsive to high-frequency fluctuations of torque developing as a result of resonance and abrupt changes of load upon said engine.

83. The driving unit of claim 80, wherein said damper has a capacity for transmission of a maximum torque when the magnitude of torque being transmitted by said output element is at least close to an upper limit of said first range.

84. The driving unit of claim 80, wherein the minimum torque being transmittable by said clutch at least during a portion of said second range exceeds about 1% of a nominal torque being transmittable by said output element.

85. The driving unit of claim 80, wherein said clutch is adjustable and further comprising means for adjusting said clutch for the transmission of at least substantially constant torque at least within a portion of said second range of magnitudes of torque being transmitted by said output element.

86. The driving unit of claim 80, wherein the rotational speed of said output element is between an idling RPM of the engine and approximately 3000 RPM within said first range of magnitudes of torque being transmitted by said output element.

87. The driving unit of claim 80, wherein the rotational speed of said output element is between an idling speed of the engine and between about 2000 RPM and about 2500 RPM within said first range of magnitudes of torque being transmitted by said output element.

88. The driving unit of claim 80, wherein the magnitude of torque being transmitted within said second range of magnitudes of torque being transmitted by said output element is between about 0.6 and 1.0 times the torque being transmitted by said output element.

89. The driving unit of claim 80, wherein the magnitude of torque being transmitted by said output element within said second range is between about 0.8 and about 0.9 times the torque being transmitted by said output element.

90. The driving unit of claim 80, wherein said engine has a main operating range and at least a major part of the characteristic field of the engine which is utilized within said main operating range coincides with said first range of magnitudes of torque being transmitted by said output element.

91. The driving unit of claim 90, wherein said characteristic field includes at least one of (a) those zones of the characteristic field which are relevant for the FTP75-cycle and (b) those zones which are relevant for the ECE cycle [city 90 kilometers per hour, 120 kilometers per hour].

92. A driving unit for a vehicle, comprising a combustion engine; means for accelerating said engine; a transmission shiftable between a plurality of progressively higher drive ratios; a hydrokinetic torque converter driven by said engine and arranged to transmit torque to said transmission; a slip clutch engageable to transmit torque from said engine to said transmission; means for monitoring the transmission of torque by said clutch and said torque converter at least during acceleration of said engine; and means (a) for disengaging said clutch when such disengagement within any one of said drive ratios entails an increase of the pulling force of the vehicle as a result of torque conversion, and (b) for shifting the transmission to a lower drive ratio when the disengagement of the clutch does not entail an increase of said pulling force.

93. A driving unit for a vehicle, comprising a combustion engine; means for accelerating said engine; a transmission shiftable between a plurality of progressively higher drive ratios; a hydrokinetic torque converter driven by said engine and arranged to transmit torque to said transmission; a slip clutch engageable to transmit torque from said engine to said transmission; means for monitoring the transmission of torque by said torque converter and said clutch; and means for (a) disengaging said clutch when such disengagement at a given ratio of said transmission entails an increase of the pulling force of the vehicle, and (b) for shifting the transmission to a different drive ratio when the disengagement of the clutch at said given ratio of said transmission does not entail an increase of said pulling force.

94. A driving unit for a motor vehicle, comprising a combustion engine having a rotary variable torque transmitting output element; a transmission; a hydrokinetic torque converter driven by said output element and arranged to transmit torque to said transmission; an adjustable slip clutch which is engageable to transmit torque from said output element to said transmission; and means for adjusting the slip of said clutch as a function of variations of the torque being transmitted by said output element.

95. The driving unit of claim 94, wherein said transmission is an automatic transmission.

96. The driving unit of claim 95, wherein said automatic transmission is a multi-step transmission.

97. The driving unit of claim 95, wherein said automatic transmission is a continuously variable transmission.

98. The driving unit of claim 95, wherein said automatic transmission is an infinitely variable change speed gear.

99. The driving unit of claim 95, wherein said automatic transmission is an infinitely variable transmission including sheaves and at least one endless flexible element trained over said sheaves.

100. The driving unit of claim 95, wherein said automatic transmission is shiftable to a finite number of discrete drive ratios.

101. The driving unit of claim 95, wherein said automatic transmission is shiftable into an infinite number of drive ratios.